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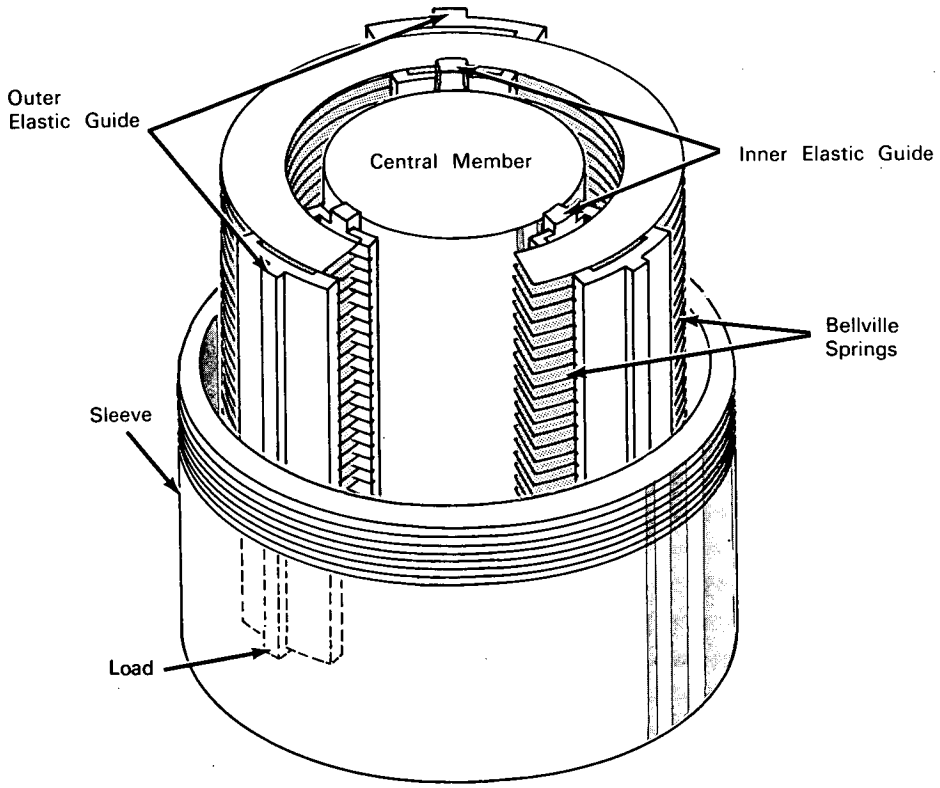
NASA TECH BRIEF

Elastic Guides Reduce Hysteresis Effect in Belleville Spring Package



The problem:

When a conical Belleville spring is deflected to the flat position, the I.D. decreases and the O.D. increases. This peripheral growth results in sliding friction at the support annuli when the spring is flexed in a conventional holder. This support friction is the main contributor to hysteresis in the spring package.

The solution:

The hysteresis present in a Belleville spring package can be greatly reduced by providing peripheral support guides that elastically flex with the slight "breathing" or radial displacement during actuation. This increases the response rate of the package for use in pressure sensitive devices.

(continued overleaf)

How it's done:

The package consists of a number of Belleville springs supported in the grooves of elastic guide members. Three outside guides are held in place by a sleeve and three inside guides are held in place by a central member.

Each guide consists of an axial rectangular column to which is attached two flexible cantilever arms. The arm extremes have a narrow row of grooves for engaging the spring periphery. The spring load is carried through the columns which engage flanges on the sleeve and on the central member. The arm faces are received so that, as the cantilever arms radially breathe with the spring during flexure, they do not rub the loading flanges.

The configuration is such that the periphery of each spring is supported at six equally spaced points.

Notes:

1. This technique provides a control device that would enhance the precision of pressure regulating valves, pressure switches, or vacuum actuators.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: B67-10011

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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